

**What is claim d is:**

1. A fuel cell system comprising:  
a fuel cell having an anode, a cathode and an electrolyte membrane put therebetween;
- 5 a fuel supply unit supplying fuel to the anode;  
an air supply unit supplying air to the cathode; and  
a heat exchanger exchanging heat between the fuel supplied by the fuel supply unit to the anode and an exhaust exhausted from the fuel cell.
- 10 2. The fuel cell system of claim 1, wherein the exhaust is exhausted from the cathode.
3. The fuel cell system of claim 1, wherein the exhaust is exhausted from the anode.
4. The fuel cell system of claim 1, wherein the exhaust  
15 is exhausted from both the cathode and the anode.
5. The fuel cell system of claim 1, wherein:  
the fuel supply unit further comprises a mixing container mixing the fuel and the exhaust so as to form a mixture in advance.
- 20 6. The fuel cell system of claim 1, wherein:  
the fuel cell is a liquid fuel cell.
7. The fuel cell system of claim 1, wherein:  
the fuel cell is a direct methanol fuel cell.
8. A fuel cell system comprising:  
25 a fuel cell having an anode, a cathode and an electrolyte membrane put therebetween;

a fuel supply unit including a mixing container mixing fuel and an exhaust exhausted from the fuel cell so as to form a mixture, the mixture being supplied to the anode;  
an air supply unit supplying air to the cathode; and  
5 a heat exchanger connected to the mixing container so as to exchange heat between ambient air and the mixture.

9. The fuel cell system of claim 8, wherein:

the mixing container is configured so that the exhaust passes through the mixture housed in the mixing container  
10 thereby gas fractions in the exhaust is separated.

10. The fuel cell system of claim 8, further comprising:  
a second mixing container communicated with the mixing container wherein the mixture is supplied from the second mixing container to the anode.

15 11. The fuel cell system of claim 8, further comprising:  
a second heat exchanger exchanging heat between the mixture supplied by the fuel supply unit and an exhaust exhausted from the anode.

12. The fuel cell system of claim 8, further comprising:  
20 a second heat exchanger exchanging heat between the mixture supplied by the fuel supply unit and an exhaust exhausted from the cathode.

13. The fuel cell system of claim 8, further comprising:  
a second heat exchanger exchanging heat between the  
25 mixture supplied by the fuel supply unit and an exhaust exhausted from the cathode and the anode.

14. The fuel cell system of claim 8, wherein:  
the fuel cell is a liquid fuel cell.

15. The fuel cell system of claim 8, wherein:  
the fuel cell is a direct methanol fuel cell.

5 16. A fuel cell system comprising:  
a fuel cell having an anode, a cathode and an electrolyte  
membrane put therebetween;  
a fuel supply unit including a mixing container mixing  
fuel and an exhaust exhausted from the fuel cell so as to form  
10 a mixture, the mixture being supplied to the anode;  
an air supply unit supplying air to the cathode;  
a heat exchanger exposed to an ambient air; and  
a circulation unit circulating the mixture between the  
mixing container and the heat exchanger so as to exchange heat  
15 between the ambient air and the mixture.

17. The fuel cell system of claim 16, wherein:

the mixing container is configured so that the exhaust  
passes through the mixture housed in the mixing container  
thereby gas fractions in the exhaust is separated.

20 18. The fuel cell system of claim 16, further comprising:  
a second mixing container communicated with the mixing  
container wherein the mixture is supplied from the second mixing  
container to the anode.

19. The fuel cell system of claim 16, further comprising:

25 a second heat exchanger exchanging heat between the  
mixture supplied by the fuel supply unit and an exhaust exhausted

from the anode.

20. The fuel cell system of claim 16, further comprising:

a second heat exchanger exchanging heat between the mixture supplied by the fuel supply unit and an exhaust exhausted from the cathode.

5 21. The fuel cell system of claim 16, further comprising:

a second heat exchanger exchanging heat between the mixture supplied by the fuel supply unit and an exhaust exhausted from the cathode and the anode.

10 22. The fuel cell system of claim 16, wherein:

the fuel cell is a liquid fuel cell.

23. The fuel cell system of claim 16, wherein:

the fuel cell is a direct methanol fuel cell.